Title: **RLC Parallel Circuit** Worksheet: 35

Course: Electrical Applications Unit: Electrical Theory CLO: 3

Name ANSWER KEY Grade 115pts. Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Objectives**

1. Student shall determine the missing component(s) in a RLC parallel circuit given other known quantities.
2. Student shall apply trigonometric functions to produce appropriate RLC parallel circuit quantities.

**Assessment**

Students shall demonstrate a comprehension of the objectives listed above by scoring a minimum of 75% on this Worksheet. Grading shall be based on an answer key.

**Theory**

A resistive-inductive-capacitive (RLC) parallel circuit is one that shares the same voltage across its resistive, inductive and capacitive components within the circuit. Since there is the existence of the impedance, both inductive and capacitive, there shall also be a curent and a power triangle.

|  |  |
| --- | --- |
| Impedance Opposition to current flow | Voltage Response Same voltage across each component |
|  |  |
|  |  |
| Current Response Total curent is the vector sum | Power Triangle Presence of Reactive Power |
|  |  |
|  |  |

**Circuit**



|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | P/Q/S | | I | | R/X/Z | E |
| R1 | 520.833mW | | 20.833mA | | 1.2kΩ | 25V |
| L1 | 904.289mVARL | | 36.172mA | | 691.15Ω | 25V |
| C1 | 431.969mVARC | | 17.279mA | | 1.447kΩ | 25V |
| Total | 977.37mVA | | 39.095mA | | 639.471Ω | 25V |
| θ | 42.203 | PF | 0.533 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | P/Q/S | | I | | R/X/Z | E |
| R1 | 520.833mW | | 20.833mA | | 1.2kΩ | 25V |
| L1 | 602.86mVARL | | 24.114mA | | 1.037kΩ | 25V |
| C1 | 647.953mVARC | | 25.918mA | | 964.575Ω | 25V |
| Total | 8.678VA | | 347.125mA | | 72.02Ω | 25V |
| θ | -4.948˚ | PF | 0.060 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | P/Q/S | | I | | R/X/Z | E |
| R1 | 260.417mW | | 10.417mA | | 2.4kΩ | 25V |
| L1 | 602.86mVARL | | 24.114mA | | 1.037kΩ | 25V |
| C1 | 647.953mVARC | | 25.918mA | | 964.575Ω | 25V |
| Total | 8.666VA | | 346.656mA | | 72.118Ω | 25V |
| θ | -9.824˚ | PF | 0.030 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | P/Q/S | | I | | R/X/Z | E |
| R1 | 260.417mW | | 10.417mA | | 2.4kΩ | 25V |
| L1 | 301.43mVARL | | 12.057mA | | 2.073kΩ | 25V |
| C1 | 647.953mVARC | | 25.918mA | | 964.575Ω | 25V |
| Total | 620.887mVA | | 24.835mA | | 1.007kΩ | 25V |
| θ | -53.075˚ | PF | 0.419 |

**Circuit**



|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | P/Q/S | | I | | R/X/Z | E |
| R1 | 260.417mW | | 10.417mA | | 2.4kΩ | 25V |
| L1 | 301.43mVARL | | 12.057mA | | 2.073kΩ | 25V |
| C1 | 1.296VARC | | 51.836mA | | 482.288Ω | 25V |
| Total | 471.279mVA | | 18.851mA | | 1.326kΩ | 25V |
| θ | -75.326˚ | PF | 0.553 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | P/Q/S | | I | | R/X/Z | E |
| R1 | 1.042W | | 20.833mA | | 2.4kΩ | 50V |
| L1 | 1.206VARL | | 24.114mA | | 2.073kΩ | 50V |
| C1 | 5.184VARC | | 103.673mA | | 482.288Ω | 50V |
| Total | 1.885VA | | 37.702mA | | 1.326kΩ | 50V |
| θ | -75.326˚ | PF | 0.553 |

Evaluations

Answer the following questions based on the last configured circuit above.

1. If the frequency is increased, the phase angle?
   1. Increases in magnitude
   2. Decreases in magnitude
   3. Stays the same
2. If the voltage is decreased, the power factor will?
   1. Increase
   2. Decrease
   3. Stay the same
3. If the capacitance is increased, the total impedance will?
   1. Increase
   2. Decrease
   3. Stay the same
4. If the resistance is increased, the total current will?
   1. Increase
   2. Decrease
   3. Stay the same
5. If the inductance is decreased, the impedance will?
   1. Increase
   2. Decrease
   3. Stay the same
6. If the frequency is decreased, the active power will?
   1. Increase
   2. Decrease
   3. Stay the same
7. If the voltage is decreased, the reactive power will?
   1. Increase
   2. Decrease
   3. Stay the same

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